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Citation: Santhi, K., Shafqat, K., Kyriacou, P. A. & Pal, S. K. (2007). Investigation of heart rate variability in patients undergoing hand surgery under axillary plexus block. British Journal of Anaesthesia, 98(2), 282P-283P. doi: 10.1093/bja/ael319

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Investigation of heart rate variability in patients undergoing hand surgery under axillary plexus block.

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Heart Rate Variability (HRV) is the study of inter-beat variability of heart rate and can be used as a non-invasive technique to assess the autonomic influence on the heart ¹. The two most commonly used methods to analyse HRV are time domain and frequency domain analysis. In the frequency domain, three frequency bands can be distinguished in the spectrum of short term (2 to 5 minutes) HRV signals ¹. These components are termed as: a) High-Frequency (HF) 0.15 Hz to 0.4Hz; b) Low-Frequency (LF) band 0.04 Hz to 0.15 Hz; and c) Very Low-Frequency band (VLF) which is the band of less than 0.04-Hz frequencies. The HF region is mediated almost entirely by the vagal tone. The LF region is an indicator of sympathetic tone, but is also modulated by vagal activity. The physiological aspects behind VLF band are not well established and therefore in short term recording this band should be avoided ¹. Using this information HRV indices such as the ratio of LF/HF power or the fractional LF power has been used to describe sympathovagal balance ². The aim of this study was to investigate the effect of local anaesthetics in patients having brachial plexus block on HRV indices. We recruited 14 ASA I-II patients, 7 males and 7 females, aged 50.57 ± 20.72 years (mean weight 67 ± 15.33 Kg, mean height 1.63 ± 0.2 m) undergoing hand surgery under axillary block. All patients received a standard mixture of 30 ml lignocaine and 20 ml of 0.5% bupivacaine with adrenaline 1:200,000 for the block. Lead II ECG signal was collected from the patients. The monitoring started 30 minutes before the start of the block and continued 30 minutes after the surgery. For frequency domain analysis 5 minutes of data (overlapped by 50 %) was analysed using a non-parametric method of spectral analysis which has been used in various HRV studies ³. The analysis showed that in almost 80% of the cases the LF/HF ratio increases just after the application of the brachial block and then decreases considerably. The timing of the drop in the ratio value differs in patients, but in each case the drop occurs within an hour of start of the block. Some examples of such changes are presented in figure 1. This initial study has indicated that HRV parameters may change during the brachial plexus block using a mixture of lignocaine and bupivacaine with adrenaline.

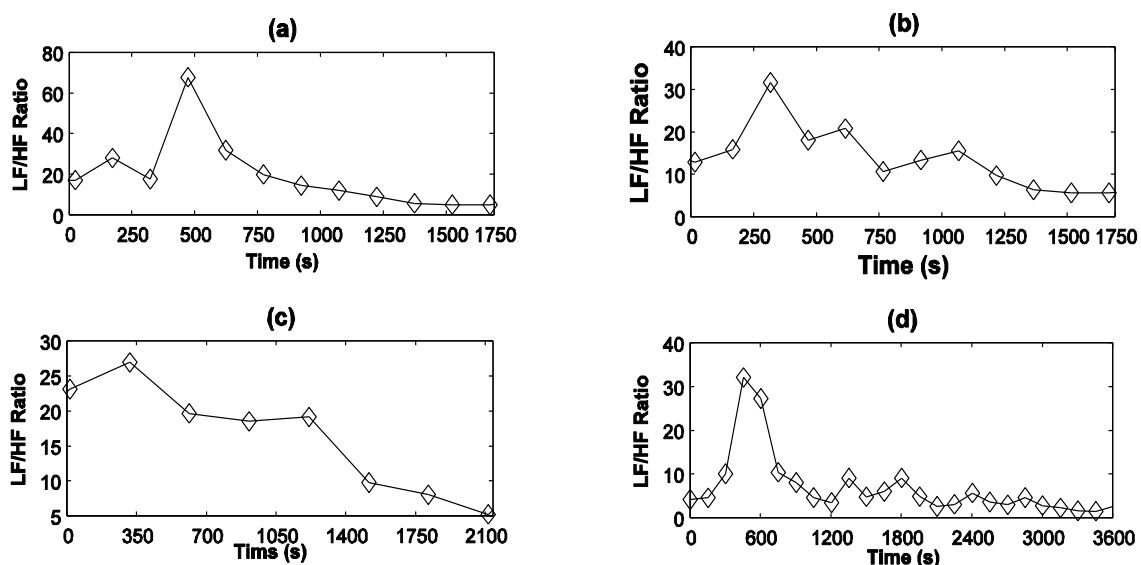


Figure 1: Ratio LF/HF changes after the brachial block.

References

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